SUSPENDED CEILING SYSTEM

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of United States Provisional Patent Application No. 60/441,003 filed January 17, 2003, and entitled "Suspended Ceiling System", the contents of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] Field of the Invention

[0003] The present invention is directed to a ceiling panel system and, more specifically, to suspending paneling secured within a geometric framework.

[0004] Description of Related Art

[0005] Suspended ceiling systems are in widespread use because of their functionality in allowing a utility structure, such as pipes, duct work, electrical wiring, etc., to be conveniently located in the space between the suspended ceiling panels and the permanent ceiling structure. Additionally, suspended ceiling systems may provide insulation and a uniform appearance to the ceiling structure.

[0006] It is well known in suspended ceiling systems to suspend ceiling panels from a grid of inverted T-rail support members. The inverted T-rail support members are suspended in spaced relation to a permanent ceiling structure. The ceiling panels are then supported by the inverted T-rail support members in spaced relation to the permanent ceiling structure. The suspended ceiling panels are typically supported from the grid of inverted T-members in edge-to-edge relation to form a continuous ceiling which conceals the permanent ceiling structure from view. The ceiling panels are installed by turning them diagonally, pushing them up into the space above a plane defined by the T-rail support members, turning them to orient them properly, and dropping them onto an upper surface of a horizontal ledge of the T-rail. The ceiling panels are sometimes provided with an off-set or rabbet along each edge, to facilitate their orientation and to enable the downward facing surface of the ceiling panels to either be flush with a lower surface of the T-rail or to project a short distance below the lower surface of the T-rail.

[0007] A drawback to the prior art supported ceiling systems is that the T-rails themselves are still visually evident after installation, hence, limiting the decorative effect of the ceiling panels.

Another drawback also relating to the decorative effect, involves the limitations imposed on the shape of the ceiling panels. Specifically, T-rails are typically arranged in a rectilinear arrangement, thereby, requiring the ceiling panels to assume a corresponding rectilinear shape. Hence, the T-rails forming the geometric structure or support grid for supporting the ceiling panels are application specific and must be pre-fabricated for any other application if other geometric shapes are desired. Another drawback with T-rail arrangements is that only gravity secures the ceiling panels within the T-rail arrangement. Hence, the ceiling panels can be readily displaced by manual upward movement of the ceiling panels toward the permanent ceiling structure and out of engagement with the T-rail arrangement.

[0008] It is, therefore, desirable to overcome the above problems and others by providing an adjustable ceiling panel system having suspended paneling secured within an adjustable geometric framework.

SUMMARY OF THE INVENTION

[0009] Accordingly, I have invented a ceiling panel system including at least one panel, a plurality of struts, a plurality of supports, a plurality of fastener assemblies, and means for securing one of the fastener assemblies to a mounting surface. At least one of the plurality of fastener assemblies is configured to secure at least one of the struts and at least one of the supports in spaced parallel relation with at least a portion of one of the panels sandwiched therebetween. The fastener assembly includes a bolt having a head and a shaft, and a button for threadingly engaging the shaft. The securing means includes a mount, wherein the head is secured within a channel of the mount and the mount is secured to the mounting surface. Additionally, the ceiling panel system includes a second panel secured adjacent and coplanar to the first panel. The second panel is secured within the ceiling panel system in a similar manner as the first panel. One or more spacers may be utilized to separate the first panel from the second panel. Optionally, the ceiling panel system includes an edge cover positioned between the first panel and the support. The ceiling panel system may also include an edge molding attached to an edge of one of the panels. A method for installing the ceiling panel system is also disclosed.

[0010] The ceiling panel system can be mounted directly to wooden joists or directly over a cracked or unsightly ceiling structure. The ceiling panel system can also be suspended from structural steel such as bar joists. Thus, the ceiling panel system is appropriate for both

residential and commercial applications. Once installed, the ceiling can remain untouched or, the ceiling panel system allows for removal of the panels without the use of tools, for access to the area between the panels and the permanent ceiling structure.

[0011] Still other desirable features of the invention will become apparent to those of ordinary skill in the art upon reading and understanding the following detailed description, taken with the accompanying drawings, wherein like reference numerals represent like elements throughout.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. 1 is a cutaway bottom-up view of a ceiling panel system in accordance with the present invention;

[0013] FIG. 2a is a view taken along lines II-II in FIG. 1 showing a first embodiment securing means;

[0014] FIG. 2b is a view taken along lines II-II in FIG. 1 showing a second embodiment securing means;

[0015] FIG. 3 is a top-down view of the ceiling panel system in accordance with the present invention in relation to a mounting surface;

[0016] FIG. 4 is an enlarged view of a portion of the ceiling panel system shown in FIG. 1; and

[0017] FIG. 5 is a view taken along lines V-V in FIG. 1.

DETAILED DESCRIPTION OF THE INVENTION

[0018] For purposes of the description hereinafter, spatial or directional terms shall relate to the invention as it is oriented in the drawing figures. However, it is to be understood that the invention may assume various alternative variations, except where expressly specified to the contrary. It is also to be understood that the specific apparatus illustrated in the attached drawings, and described in the following specification, is simply an exemplary embodiment of the invention. Hence, specific dimensions and other physical characteristics related to the embodiments disclosed herein are not to be considered as limiting.

[0019] FIGS. 1-4 show a ceiling panel system 10 that includes one or more panels 12, a plurality of fastener assemblies 14, a plurality of struts 16, a plurality of supports 18, and plurality of securing means 20. Fastener assemblies 14, struts 16, and supports 18 are utilized to

form a geometric framework 21 for securing the panels 12 therein. The geometric framework 21 is secured to an overhead mounting surface 22, such as pre-existing finished ceiling or overhead joists of an unfinished ceiling. The resultant assembly may be combined with other such assemblies to cover an overhead area with an aesthetically pleasing geometrically shaped panel design.

[0020] With specific reference to FIG. 1, each panel 12 may define any desirable polygonal geometric shape including, but not limited to, hexagonal, rectangular, square, triangular, trapezoidal, etc. For exemplary purposes, the ceiling panel system 10 will be discussed in the context of hexagonal panels. However, this is not to be construed as limiting the invention.

[0021] Each panel 12 has a visible side 24 and a hidden side 26. The visible side 24 of each panel 12 faces away from the ceiling structure and is visible when viewed from below the ceiling panel system 10, whereas the hidden side 26 faces the ceiling structure and is not visible when viewed from below the ceiling panel system 10. The visible side 24 and the hidden side 26 designations are for illustrative purposes and are not to be construed as limiting the invention.

[0022] Each panel 12 may be of fiberglass construction, such as Whispertone® tackboard, manufactured by Johns Manville, or any other suitable material. Desirably, the material is lightweight, resilient, flexible, insulative, fungal resistant, and fire resistant. The visible side 24 of the panel 12 may include a Permacrete® coating bonded thereto to provide an even greater aesthetic quality to the ceiling panel system 10. However, the material(s) forming each panel 12 and/or any coating(s) thereon are not to be construed as limiting the invention.

[0023] With specific reference to FIG. 2, and with continuing reference to FIG. 1, fastener assembly 14 includes a bolt 28 having a head 30 and a threaded shaft 32. A fastener, such as a button 34, is configured to be threadably received on the end of the threaded shaft 32 opposite head 30. The purpose of fastener assembly 14 is to interconnect strut 16 and support 18. Thus, one having ordinary skill in the art would appreciate that the fastener assembly 14 may be of various construction but still fulfill the intended interconnection of strut 16 and support 18.

[0024] Fastener assembly 14 is constructed so that rotation of button 34 in one direction causes button 34 to threadably engage shaft 32, whereas rotation of button 34 in the other direction causes button 34 to threadably disengage from shaft 32. It is to be understood that instead of a threaded arrangement, fastener assembly 14 may utilize any other suitable method for removably securing button 34 to shaft 32. These methods may include, but are not limited to,

a wedge-like step-locking arrangement and a removable pin arrangement. Additionally, fastener assembly 14 includes a nut 36 threadably secured onto shaft 32.

[0025] As shown in FIG. 2a, each strut is generally flat. Moreover, each strut 16 has a length longer than the length of any edge of each panel 12. For example, if each edge of each panel 12 is 18 inches in length, then struts 16 utilized in forming the geometric framework 21 for the panel 12 will each be longer than 18 inches in length. When an end of strut 16 is to be secured to fastener assembly 14, the end of the strut 16 includes a hole 38 for receiving threaded shaft 32 of bolt 28 therethrough. Each strut 16 is desirably of steel construction or other suitable material or arrangement that exhibits rigidity. For example, strut 16 may be of sheet metal construction, wherein the sheet metal is folded onto itself the length of strut 16, so as to impart additional rigidity to strut 16. Optionally, each strut 16 may include one or more spacers 40 extending perpendicularly along the length of the strut 16 to avoid lateral shifting of panels 12 mounted on either side of spacer 40.

[0026] Each support 18 includes a hole 42 for receiving threaded shaft 32 of bolt 28 therethrough. Support 18 may of any size sufficient to effectively support a portion of panel 12 thereon. The shape of each support 18 can be dictated by the aesthetic quality that one wishes the ceiling panel system to embody. Thus, it is desirable that the shape of each support 18 is harmonious in design with the geometric shape of the panel 12. In the embodiment shown in FIG. 1, supports 18 are a modified triangular shape, whose edges are squared and are positioned generally perpendicularly aligned with corresponding edges of panels 12. Each support 18 may be constructed of the same material as panels 12. Additionally, each support 18 may include internal supports to prevent the support 18 from deforming when a compressive pressure is applied thereto when button 34 is threaded onto shaft 32 of bolt 28.

[0027] The function of each securing means 20 is to secure the ceiling panel system 10, inclusive of securing means 20, to overhead mounting surface 22. Overhead mounting surface 22 may be any type of ceiling structure including, but not limited to, a plastered ceiling, joists, and structural steel, such as bar joists. Thus, the ceiling panel system 10 may be secured to mounting surfaces in either residential or commercial environments. In the embodiment shown in FIG. 2a, mounting surface 20 is a wooden joist and securing means 20 includes a mount 44 and a wood screw 46. Mount 44 includes an elongated channel 48 configured to receive head 30 of bolt 28 therein. Channel 48 may be configured so that head 30 is secured against rotation by

channel 48. Mount 44 includes a lower open portion that is sized to permit threaded shaft 32 to drop therethrough while preventing head 30 from vertically dislodging from channel 48. Mount 44 can be rotated around an axis of wood screw 46 and bolt 28 may be moved along the length of channel 48 to enable repeatable reproduction of the geometric shapes comprising ceiling panel system 10 regardless of horizontal variances encountered in mounting surface 22 during the installation of ceiling panel system 10.

[0028] With specific reference to FIG. 4, an upper portion of mount 44 may include a plurality of holes, such as a central hole 50a and offset holes 50b and 50c. Each hole 50a-c is sized to receive wood screw 46 therethrough. Having offset holes 50b and 50c further compensates for any horizontal variances in mounting surface 22 during the installation of ceiling panel system 10. It will be apparent to one having ordinary skill in the art that the aforementioned securing means 20 is but one manner for securing ceiling panel system 10 to overhead mounting surface 22. It is to be understood that various securing means 20 may be utilized depending on the type of overhead mounting surface 22. For example, as shown in FIG. 2b, if overhead mounting surface 22 is a T-bar joist 51, then securing means 20 may include a C-Clamp device 52 or suitable substitute for securely clamping an upperside and an underside of an edge of T-bar joist 51. It is also to be understood that securing means 20 may directly secure strut 16 to mounting surface 22, thereby not requiring the use of mount 44. For example, each hole 38 of each strut 16 may accommodate wood screw 46 therethrough and into mounting surface 22. It is also to be understood that in drop applications, bolt 28 may be extended to various lengths to achieve the desired distance between strut 16 and mounting surface 22. In addition, nut 36 may be positioned on bolt 28 as desired to achieve the desired distance between strut 16 and mounting surface 22.

[0029] With reference to FIG. 5, and with continuing reference to FIGS. 1-4, desirably, ceiling panel system 10 includes one or more edge covers 53 and/or one or more edge moldings 54. The purpose of each edge cover 53 is to cover the gap 55 created when two panels 12 are placed adjacent to each other along their edges. Each edge cover 53 is desirably of steel construction or other suitable material or arrangement that exhibits rigidity. Thus, each edge cover 53 may be of similar construction as strut 16. Edge covers 53 may vary in size and shape depending upon the geometric panel design. Desirably, each edge cover 53 is long enough to cover any visible gap 55a between two panels 12 when the panels 12 are viewed from their visible side 24. Edge

covers 53 may or may not have the same coating as the panels 12, depending upon whether or not it is desired to have the edge covers 53 contrast to or blend in with the panels 12.

[0030] Similar to the gap-covering function of edge cover 53, edge molding 54 may cover any gap 55b between the edge of a vertical wall 56 and any panel 12 abutting vertical wall 56. Additionally, edge molding 54, in combination with any edge cover 53, offers a uniform appearance to ceiling panel system 10 by providing an aesthetic trim design around the edges of panels 12. Each edge molding 54 has a modified U-shaped construction configured to receive the edge of panel 12 and an end of an edge cover 53 therein. Desirably, edge molding 54 provides a compressive fit for the edge of panel 12 and edge cover 53 so that panel 12 and edge cover 53 are removably attached to edge molding 54. Edge molding 54 may be constructed of the same material as strut 16 or a lighter material, such as aluminum. Edge molding 54 may include a hole (not shown) in its vertical side, so that a fastener, such as nail or screw, may secure edge molding 54 to vertical wall 56. Visible portions of edge molding 54 may have the same coating as panels 12.

[0031] In the desirable embodiment of the present invention, installation of ceiling panel system 10 begins with determining the geographic shape of the panels 12 to be used in ceiling panel system 10. It is to be understood that panels of different geometric shapes may be combined in the same ceiling panel system 10 application. In the exemplary embodiment, hexagonal panels 12 are chosen. Therefore, desirably, each hexagonal panel 12 not adjacent to vertical wall 56 requires six fastener assemblies 14, six struts 16, six supports 18, and six edge covers 53. As shown in FIG. 3, mounting surface 22 includes a plurality of joists, with each joist spaced either a standard 18" or 24" apart from each successive joist. In the exemplary embodiment, a hypothetical tiling of panels 12 results in each corner of each panel 12 not adjacent to vertical wall 56 to be aligned with a corresponding joist, thereby forming a corresponding point location 58. It is to be understood that point locations 58 may be determined by measurements substantially corresponding to the length of each edge of panel 12.

[0032] At each point location 58, mount 44 is secured to the joist via a corresponding wood screw 46 through hole 50a, 50b or 50c. It is to be understood that securing means 20 may also secure ceiling panel system 10 to drywall or plaster through the use of anchors and the like. Thus, not all point locations 58 must be situated on a joist. Lateral adjustments may be made to the position of each mount 44 by utilizing any of the offset holes 50b and 50c. Thereafter, bolt

28 is slid laterally into channel 48 of mount 44, so that head 30 rests within the channel 48 and threaded shaft 32 drops through the open portion of mount 44. Mount 44 may be rotated, as needed, around hole 50a, 50b or 50c through which wood screw 46 secures mount 44 to the joist to enable shaft 32 to be positioned where needed. This process continues until each point location 58 has the corresponding mount 44 secured thereto.

[0033] Geometric framework 21 is constructed by forming a frame 60 corresponding to the geometric shape of each panel 12. Specifically, each edge of the geometric shape is represented by a corresponding strut 16 affixed to the threaded shafts 32 extending from two mounts 44. For example, with hexagonal panels 12, the ends of each of the six struts 16 are affixed to two threaded shafts 32 to form a hexagonal frame. Thus, each threaded shaft 32 has affixed thereupon an end of a first strut 16a and an end of a second strut 16b, as shown in FIG. 3, thereby interconnecting first strut 16a and second strut 16b. Due to each mount 44 having the ability to pivot around the hole 50a, 50b or 50c through which wood screw 46 secures mount 44 to the joist, and because of the sliding movement of bolt 28 within channel 48 of mount 44, frame 60 may be brought into congruency with and to correspond to the geometric shape of panel 12. Once such adjustments have been made, the corresponding nut 36 of each fastener assembly 14 is threaded to a desired position on the corresponding threaded shaft 32.

[0034] If bolt 28 is spaced from mount 44 to facilitate vertical alignment of one or more struts 16, another bolt (not shown) can be received on shaft 32 and tightened against mount 44 to avoid both horizontal and vertical movement of bolt 28 within channel 48. Also or alternatively, one or more struts 16 received on shaft 32 can be sandwiched between bolt 28 and another bolt (not shown) on shaft 32 to avoid vertical movement of the struts 16 on shaft 32. Additional struts 16 may be installed to complete the intended geometric framework 21. It is to be understood that any strut 16 of frame 60 may serve as part of another frame 62, thus not requiring a doubling of struts 16 for shared edges in geometric framework 21. As shown in FIG. 4, utilizing the same threaded shafts 32 in installing geometric framework 21, results in each threaded shaft 32 interconnecting the ends of three struts 16 through the corresponding holes 38 of each of those three struts 16.

[0035] Thereafter, panels 12 may be installed within each frame 60. Specifically, each support 18 corresponding to a corner of frame 60 is placed on the corresponding threaded shafts 32. Button 34 is then threaded onto the threaded shaft 32 in order to hold support 18 so that

panel 12 may be easily inserted between support 18 and strut 16. Spacers 40 extending downwardly from each strut 16 prevent the panel 12 from shifting into adjacent frames and/or offsetting any other adjacent panel 12. Panel 12 is then secured within frame 60 by further tightening buttons 34, thereby compressing panel 12 between strut 16 and support 18. Panel 12 is then positioned adjacent strut 16 and adjacent support 18. It is to be understood that adjacent is herein defined as lying near, adjoining, abutting, or any derivatives thereof. In an alternative installation, each panel 12 may be held within the frame 60 while each support 18 is placed over the corresponding threaded shaft 32 and button 34 is threaded upon threaded shaft 32. It is to be understood that supports 18 may be aligned, e.g., rotated, in whichever direction provides a more overall aesthetic appeal in the context of ceiling panel system 10. For example, as shown in FIG. 1, the "corners" of the modified triangular supports 18 are aligned perpendicular to the direction of gaps 55 formed between adjacent panels 12.

[0036] Alternatively, support 18 may be configured to threadably receive the end of threaded shaft 32 therein. Thus, instead of turning button 34 to cause the support 18 to be brought closer to strut 16 and securing panel 12 between support 18 and strut 16, turning the actual support 18 itself may also fulfill the same function, thereby foregoing the use of button 34.

[0037] Prior to fully securing supports 18 against panels 12, edge covers 53 are desirably installed over gaps 55 formed between two adjacent panels 12. Desirably, edge covers 53 are sufficient in length to cover the distance of gap 55, from at least one support 18 to another support 18, and long enough so that the ends of each edge cover 53 are secured between supports 18 and panels 12 on either end of each edge cover 53, as shown in FIG. 2a. Thus, support 18 no longer directly supports panel 12. Rather, support to panel 12 is provided indirectly through edge cover 53 contacting both support 18 and panel 12. Furthermore, as shown in FIG. 5, edge molding 54 may be attached to the edges of panels 12 that are adjacent to vertical walls 56.

[0038] Once installed, ceiling panel system 10 allows for efficient removal of panels 12 without the use of tools, so that the area between panels 12 and the permanent ceiling structure may be accessed. Specifically, each button 34 can be removed from or loosened on its threaded shaft 32 to facilitate removal of an adjacent panel 12. It is to be understood that ceiling panel system 10 may be coated, painted, or decorated even after it has been installed. Due to the sturdiness of framework 21 of ceiling panel system 10, fixtures, such as lamps, may be attached to one or more of panels 12 and/or suspended therefrom.

[0039] The invention has been described with reference to the desirable embodiments. Obvious modifications and alterations will occur to others upon reading and understanding the preceding detailed description. It is intended that the invention be construed as including all such modifications and alterations insofar as they come within the scope of the appended claims or the equivalents thereof.